[COMMITTEE PRINT]

NATIONAL ENERGY CONSERVATION POLICY UNDER THE REAGAN ADMINISTRATION: ANALYSIS OF HEARINGS ON THE DEPARTMENT OF ENERGY AUTHORIZATION FOR FISCAL YEAR 1982

REPORT

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FOR THE

SUBCOMMITTEE ON
ENERGY DEVELOPMENT AND APPLICATIONS

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March 24, 1982

LETTER OF TRANSMITTAL

To All Members of the Committee on Science and Technology:

I am herewith transmitting a report prepared by the Congressional Research Service for the Subcommittee on Energy Development and Applications entitled: "National Energy Conservation Policy Under the Reagan Administration: Analysis of Hearings on the Department of Energy Authorization for Fiscal Year 1982."

The report summarizes hearings held on February 26, March 4, 5, 13 and 17, 1981 by the Energy Development and Applications Subcommittee on the Department of Energy's Conservation Research, Development and Information Dissemination programs. The purpose of the hearings was to examine the impacts of reductions in the DOE energy conservation budget proposed by the Reagan Administration in its FY 1982 authorization request. Issues covered included the extent to which the private sector would pick up the research efforts terminated by the Federal Government; the possible effects of program terminations on the competitiveness of U.S. energy conversion equipment in world markets; the cost-effectiveness of existing Federal energy conservation programs; and the ability of state and local governments to assume responsibility for energy conservation outreach and information dissemination programs. Because these issues remain topical, this summary and analysis of the hearings was requested for our use in further deliberations and to aid us in our decisionmaking process on matters relating to the future of the DOE's energy conservation programs.

Any comments from the Members of the Committee, other Members of Congress or private individuals will be welcome.

Sincerely,

DON FUQUA
Chairman

DF:Fwm

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LETTER OF SUBMITTAL

March 9, 1982

Honorable Don Fuqua
Chairman, Subcommittee on Energy Development and
Applications
Committee on Science and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed is the report entitled "National Energy Conservation Policy Under the Reagan Administration: Analysis of Hearings on the Department of Energy Authorization for Fiscal Year 1982," which was prepared by the Science Policy Research Division of the Congressional Research Service in response to your request.

The report summarizes some of the major issues in energy conservation policy, including the significance of energy conservation to the national economy, foreign competition and the international environment, prospect for increased private sector participation, and prospect for increased State and local participation. It also addresses issues associated with the role of the Federal Government in energy conservation in buildings, industrial energy conservation, outreach and information dissemination, and community systems.

The report was prepared by Fred J. Sissine, Analyst in Energy Technology, of the Science Policy Research Division.

I trust that this report will serve the needs of your committee as well as those of other committees and individual Members of Congress concerned with the development of energy conservation technologies and the implementation of energy conservation programs. On behalf of the Congressional Research Service, I wish to express my appreciation for the opportunity to undertake this timely and worthwhile assignment.

Sincerely,

Gilbert Gude
Director

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

NATIONAL ENERGY CONSERVATION POLICY UNDER THE REAGAN ADMINISTRATION: ANALYSIS OF HEARINGS ON THE DEPARTMENT OF ENERGY AUTHORIZATION FOR FISCAL YEAR 1982

by
Fred J. Sissine
Analyst in Energy Technology
Science Policy Research Division
March 9, 1982

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I. PURPOSE OF THE HEARINGS

On February 26 and on March 4,5,13, and 17, 1981, the House Science and Technology Committee, Subcommittee on Energy Development and Applications held hearings on the Fiscal Year 1982 Department of Energy Authorization for Energy Conservation Programs. The Administration's budget request calls for major reductions in conservation activities in FY82, based on the belief that rising energy prices have eliminated most of the need for Government incentives and regulations which were originally intended to stimulate domestic conservation efforts. It should be noted that many of the issues related to the budget request had been mentioned in recent studies performed by the Office of Technology Assessment (OTA) 1/ and the General Accounting Office (GAO). 2/ The subcommittee

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1/ U.S. Congress. Office of Technology Assessment. Conservation and Solar Energy Programs of the Department of Energy: A Critique. Report (OTA-E-120), June 1980. Wash., D.C., U.S. Govt. Print. Off., 1980. 80 p.

2/ U.S. Congress. General Accounting Office. Energy Conservation: An Expanding Program Needing More Direction. Report to the Secretary of Energy (EMD-80-82), July 24, 1980. Wash., D.C., U.S. Govt. Print. Off., 1980. 15 p.

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has been concerned with the conservation issues mentioned in these two reports, and had examined some of the concerns raised in the GAO report at recent hearings. 3/ In continuing its examination of these and other issues, the present

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3/ U.S. Congress. Committee on Science and Technology. Subcommittee on Energy Development and Applications. Oversight: DOE Solar and Conservation Programs. Hearings. 96th Congress, 2d Sess., June 12, 1980 and Sept. 9, 1980. Wash., D.C. U.S. Govt. Print. Off., 1980. p. 123-208.

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hearings were designed to study broad issues related to (1) the impact of the of the Administration's proposed reductions in spending for conservation; (2) the effects of foreign competition on U.S. and world markets for energy-efficiency equipment; (3) the extent to which private industry would be able to assume responsibility for the demonstration and commercialization of energy conservation technologies for buildings, industry, community systems, and consumer products; and (4) the extent to which State and local governments would be able to assume responsibility for energy conservation outreach and information dissemination efforts. An underlying purpose of the hearings was to identify what, if any, revisions of the Administration's proposals should be made by the Congress in order to ensure that the Federal Government fulfills its appropriate role.

Twenty-five witnesses from Government, industry, professional associations, and academia were asked to testify. They were:

Hon. Toby Moffett, U.S. Congress, House of Representatives.

Mr. Gene C. Brewer, President, National Institute of Building Sciences.

Mr. Grant Thompson, Senior Associate, Conservation Foundation.

Mr. Theodore F. Mariani, Assistant Commissioner for Energy, American Institute of Architects.

Mr. Gardner S. McBride, Executive Vice President, Building Owners and Managers Association.

Dr. Thomas E. Stelson, Vice President for Research, Georgia Institute of Technology.

Mr. Jerry Brady, Blatchford, Epstein and Brady.

Dr. Dale Jorgenson, Department of Economics, Harvard University.

Mr. Jack Armstrong, Deputy Group Executive for Energy and Instruments, Thermo Electron Corporation.

Dr. Thomas Bustard, President, Energetic, Inc.

Mr. Roger Sant, Director, Energy Productivity Center, Mellon Institute.

Hon. Bill Bradley, U.S. Congress, Senate.

Mr. H. Hollister Cantus, Manager of Energy Programs, United Technologies Corporation.

Dr. Lloyd R. Lawrence, Director of Technical Development, Mechanical Technology, Inc.

Dr. Walter Syniuta, President, Advanced Mechanical Technology, Inc., accompanied by Mr. Michael Podolny.

Mr. James L. Barker, President, CSI Resource Systems.

Ms. Ann Cline, Director, Energy Department, Richmond, Indiana.

Mr. William Woellhof, Administrative Vice President, Kansas Power and Light.

Mr. K. Baker, Director, Iowa Energy Extension Service.

Mr. James Duffus III, Senior Group Director, General Accounting Office.

Mr. Jeremy Lifsey, Vice President, Franklin Research Center.

Ms. Joan B. Habib, Assistant Director of Resource Defense, National Wildlife Federation.

Mr. Ron Doctor, Executive Director, Western Solar Utilization Network.

Mr. Frank DeGeorge, Acting Assistant Secretary for Conservation and Solar Energy, Department of Energy.

Dr. Maxine Savitz, Deputy Assistant Secretary for Conservation and Solar Energy, Department of Energy.

II. OVERVIEW

The hearings on energy conservation R,D,&D were held to identify what, if any, revisions of the Administration's proposals should be made by the Congress in order to ensure that the Federal Government fulfills its necessary and appropriate role in energy conservation activities. Generic and sectoral policy issues were examined during the course of the hearings. The primary generic issues were: the significance of conservation to the national economy, the erosion of marketplaces for conservation equipment by foreign competition, the prospect for increased private sector participation, the prospect for increased State and local government participation, and the proper role for the Federal Government. Sectoral issues focused on the Federal role in energy conservation activities related to buildings, industry, outreach and information dissemination, and consumer products and community systems.

Several witnesses testified that energy conservation activities may have a significant impact on the national economy by reducing oil imports and slowing the inflation rate. However, some committee members felt that it was more important to attack inflation by reducing the Federal budget and to let the marketplace resolve energy issues. Nevertheless, a good deal of the testimony suggested that increased conservation could reduce the demand for petroleum fuels which, in turn, would reduce national dependence on foreign oil imports. Some witnesses indicated that a significant impact had already been achieved, and others emphasized the potential for future reductions. Furthermore, it was argued that the resultant decrease in energy use would, in turn, stabilize energy prices and thereby curb inflation. Finally, it was also pointed out

that increased U.S. production of energy-efficient equipment could improve the economy through an improved balance of payments. The one major problem identified was the erosion of the U.S. position in markets for energy efficient-products by foreign government-industry teams. The U.S. response to foreign competition, in terms of special tax treatments and depreciation rates, was described as inadequate. It was suggested that the Administration's proposed reductions in spending for conservation could even further damage the capacity of U.S. industry to compete. It was argued that an innovation in Federal policy was needed to combat the encroachment of foreign competition. Some witnesses argued that the innovation should take the form of increased government-industry cooperation in the development of energy-efficient conversion equipment. These witnesses pointed to the different types of government support, which includes assistance for implementation as well as R&D, offered to industry in Japan and West Germany. In contrast to this approach, an opposing point of view recommended a focus on broader macroeconomic policies, such as those proposed by the Administration.

The Reagan Administration proposed major cutbacks and terminations in energy conservation research, demonstration, commercialization, and implementation activities. The extent to which the private sector would pick up an increasing share of the expenses involved in these activities was a major issue at the hearings. Some testimony was taken in support of the Administration's policy, which assumes that price decontrols, regulatory relief, and excess profits would provide sufficient incentives for the private sector to pursue an adequate amount of energy conservation activity. On the other hand, other witnesses argued that market failures and other barriers prevent the private sector from supporting adequate amounts of energy conservation activity.

Witnesses identified both generic and sectoral market imperfections. Generic market defects include capital shortages, lack of marketing expertise, and difficulties in identifying markets. Sectoral market imperfections include the following: In the buildings sector, a lack of institutions to supply capital for research, a lack of returns on certain types of innovations, and the landlord-tenant incentive gap. In the industrial sector, the cost of capital and the long payback period for R&D investments. In the utility sector, difficulty generating the excess profits needed to invest in conservation. It was also pointed out that the private sector generally lacks the resources and the motivation to provide objective information on the economic advantages of conservation measures to consumers.

The hearings revealed that implementation of the Administration's proposal to reduce Federal support for community-level energy conservation activities could have a significant effect on State and local participation in conservation, especially in the dissemination of information. The extent to which State and local governments would pick up an increasing share of the expenses involved in these activities was an important issue. Some witnesses described the evolving role of local government in activities such as cogeneration and municipal waste-to-energy projects. Others pointed to the financial difficulties of State governments and the need for a continuing partnership in project funding between State government and Federal Government. The opportunity for increased local responsibility in activities such as energy extension services and regional information centers was also discussed.

The determination of the proper role for the Federal Government in energy conservation is an important component of both short-term and long-term national energy policy. The Government increased dramatically its role in conservation research, development, demonstration and implementation for all sectors of the

economy during the period from FY75 through FY80. The Administration's proposal to reduce Federal involvement in conservation activity evoked a variety of opinions about the past, present and future role of the Federal Government. The Administration's position that long-term R&D should be the focus of the conservation effort was supported by some participants, who questioned the effectiveness of DOE in general and conservation programs in particular. Other witnesses argued that many past conservation efforts supported by DOE had performed well and proven to be highly cost-effective. Some testimony also stressed the importance of support for implementation activities and the need for innovative ways of encouraging R&D.

The hearings also focused on issues of Federal support for particular sectors of energy conservation activity. In the buildings sector, issues relating to information, finance, R&D, education, regulations, and weatherization were raised. Some witnesses pointed out the need for information on efficiency improvements and weatherization for renters and home owners. The building industry's need for information about product reliability and implementation experience was also stressed. Other testimony indicated that consumers need financial assistance for home improvements and that the small companies which make up the buildings industry need support for R&D and educational assistance for architects and engineers. There was some suggestion that the effort to establish building temperature controls had experienced significant difficulties because of its mandatory approach. This experience was the basis for a recommendation that the Building Energy Performance Standards (BEPS) be converted from regulations into voluntary guidelines. However, it was also suggested that regulations may have a role to play in reforming utility billing practices for renter-occupied buildings. Some witnesses indicated that although weatherization and equipment efficiency improvement programs had proven to be significantly more cost-effective than many other Federal programs, an incentive problem still

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remained. A recommendation was made that the problem of encouraging such improvements by home owners could be ameliorated by Federal support for home energy audits. Additionally, it was advised that a portion of fuel subsidies for low income renters could be converted into weatherization assistance.

The DOE industrial conservation effort, based on a strategy of diversification and cost-shared demonstrations, was described as one of the most effective conservation programs. However, some witnesses indicated the need for Federal involvement will continue since demand for energy will grow in the years ahead and general economic trends make R&D increasingly difficult for private industry to support. There was some indication from witnesses that the Administration's proposed tax and depreciation policies will not provide adequate R&D and market penetration support to combat foreign competition since industry is predisposed to use this type of assistance for non-energy related investments. Some alternative policies recommended were: R&D sponsorship with later reimbursement, an industrial R&D tax credit; and an investment tax credit for the purchase of energy-efficient equipment.

In contrast to the Administration's recommendation that the Federal Government stop its information outreach activities, a majority of the witnesses provided testimony on the importance of a Federal role in outreach and information dissemination. Some focused on overlapping efforts and the need to consolidate existing information programs, and others emphasized the need to increase the availability of conservation information through existing solar information sources. It was suggested that a Federal role in dissemination is appropriate since the private sector can't do it and since the scale of Federal programs make them very cost-efficient. Several types of information needs which create a demand for a Federal role were identified. The descriptions of consumers' needs included information related to finding contractors, architects, and

builders; assessing product efficiency, energy savings, and payback; and obtaining Federal and State tax credits. It was also noted that builders, contractors, architects and engineers need information about energy efficient buildings, equipment, and designs.

Some testimony focused on the past shortcomings of Federal information outreach efforts. It was pointed out that fragmentation of the Federal effort may be discouraging consumers seeking information. Some also noted that unnecessary constraints were impeding the distribution of conservation information from regional information centers. Most witnesses agreed that the problems with the existing Federal system require a more active Federal effort in conservation outreach; one which emphasizes audits, more personalized and tailored information for consumers, and an expanded role for regional information centers. An opposing point of view concluded that rising energy prices will stimulate conservation activity without a Federal information dissemination effort.

Some witnesses provided testimony on the importance of the Federal role in community systems. The need for price supports to assist urban waste to energy projects was brought up, as was the problem of creating incentives for the implementation of district heating systems. It was claimed that, in general, the area of conservation activity for community systems has a great potential for energy savings, but involves complex institutional barriers which require a Federal role.

III. BASIC ISSUES IN ENERGY CONSERVATION POLICY

These hearings grew out of a concern that Administration proposals to terminate, or cut back dramatically, Federal support for energy conservation programs could harm what is regarded by some as the "cornerstone" of our national energy policy.

Energy conservation can be interpreted to mean either increased efficiency of energy use through the implementation of technical improvements or decreased use of energy through the implementation of curtailments in the social patterns of energy consumption. Mechanical or electrical devices which improve the efficiency of energy conversion or distribution processes are referred to as efficiency equipment or energy-efficient equipment. The hearings focused on conservation in terms of equipment use rather than curtailments in social patterns.

A. SIGNIFICANCE TO THE NATIONAL ECONOMY

Several facets of the relationship between energy conservation activities and the national economy were surfaced during the hearings. Of major importance were the differing viewpoints concerning the past and future impacts of conservation on oil imports, the inflation rate, and international markets. Receiving less attention was the relationship of conservation to utility productivity and the cost of energy services to consumers.

Several witnesses testified to the importance of energy conservation as a means for reducing national dependence on oil imports. Dr. Thomas Bustard stressed the magnitude of the problem:

> . . . nowhere in the Administration's plan for economic recovery is the almost $100 billion per year drain from our economy for purchase of foreign fuels addressed. . . . This loss from the U.S. economy is just as insidious as Government deficit spending, and perhaps even more so from the standpoint that these are moneys that are lost from our economy. . . . The only possible alleviation to this type of deficit spending is conservation. (158)

Dr. Thomas E. Stelson, the former Assistant Secretary for Conservation and Solar Energy at the Department of Energy, concurred with this assessment, and observed that conservation had recently made a significant impact on the oil import problem:

> The energy conservation programs of the United States are really impressive examples to the world of effective containment of the cartel manipulations of OPEC. Oil importation into the United States has declined from a peak of about 8.8 million barrels per day to about 5.6 [million] barrels of oil per day in a short period of only 2 years. . . . In 1980 alone, the reduction in oil energy imports in the United States was more than $25 billion. (77)

Other witnesses put greater emphasis on the potential for energy conservation to reduce oil imports in the future. Mr. James Duffus III, a Senior Group Director at the General Accounting Office, agreed with Dr. Bustard, and stated that "energy conservation can make a direct contribution to reducing the Nation's dependence on imported oil". (439) Furthermore, he argued that the contribution from conservation had not yet been fully realized and that the importance of ameliorating the oil import problem merited a continued Federal involvement:

> Despite substantially higher energy prices over the past few years, the Nation has still failed to alleviate its vulnerability to supply disruptions. We believe this situation, along with the significant potential for increasing energy efficiency, indicates a continued Federal need to facilitate and supplement market forces to assure that increased energy conservation is achieved in a timely manner. (439)

Dr. Lloyd R. Lawrence concurred with Mr. Duffus that the United States was not yet doing enough in the conservation area. However, he focused more on the attendant international trade aspect of the problem. Dr. Lawrence observed that, "We are now negatively impacting our balance of payments through the purchase

of foreign energy-efficient equipment, the need for which was brought on by the purchase of foreign oil." (220) Dr. Lawrence testified that the U.S. needs to reestablish a strong position in domestic and international markets for efficiency equipment. (220) In terms of domestic markets for existing conservation technologies, Mr. Roger Sant suggested that from a consumer standpoint it makes sense to invest as much as $364 billion in new cars and $250 billion for industrial cogeneration over the next two decades, and $10 billion a year for residential retrofits during the 1980s. (167) Dr. Lawrence concluded that the result of strengthening the U.S. position in domestic and international markets would be a reduction in demand for oil imports due to technology implementation, an improved balance of payments, a net influx of capital into the successful industries, and a major positive impact on employment. (220)

Mr. Sant provided testimony that national dependence on foreign oil imports is a symptom, not the cause, of current energy problems. (190) He emphasized that the real problem is that the cost of energy services is higher than it needs to be, and that the nation needs to adopt a "least-cost" strategy which aims at minimizing the cost of energy services. (190,166) This strategy is based on "a major substitution of end use technologies for fuel", and would require a major change in investment patterns. (166,188) According to Mr. Sant, investment in the development and use of conservation technology is a means for producing economic growth and reducing inflation. (190)

Rep. Judd Gregg presented a view of the relationship between energy and inflation which contrasted with that expressed by Mr. Sant. Mr. Gregg stated that:

> It seems to me, to maintain a program in light of the need to cut the budget, the need to get inflation under control, is a mistake. We have got to address inflation first. The purpose of

> the President's program is to address inflation first, and he made a tactical decision that the energy issue will be resolved in the marketplace, and there is significant evidence to support that, and I believe that that is the direction in which we should move. (136)

Furthermore, Mr. Gregg emphasized that:

> I personally don't feel that the return in dollars that we've gotten from the conservation programs at the Department of Energy have outweighed the cost of those dollars in inflationary terms...It is my perception that the conservation programs of the Department of Energy have more negatives on the inflationary side than plusses on the conservation side. (13)

However, Mr. Sant chose to focus on the possibility that future efforts to conserve energy could reduce the current inflationary spiral. He argued that projections based on the least-cost strategy show that:

> . . . the inflationary impact on the cost of heating, lighting and energy services in general might in fact be down, that the inflationary effects in the next two decades may in fact be benign, and that we may have seen the worst of the impacts of increased oil prices. (166)

Dr. Dale Jorgenson concurred with Mr. Sant that energy conservation policy could have a significant impact on inflation. He indicated that the energy savings derived from DOE conservation programs already in place before implementation of the Reagan Administration's proposed cutbacks could reduce the impact of higher petroleum prices on inflation in the U.S. economy:

> We calculate on the basis of the conservaion initiatives in place in the Department of Energy...that with the decreased consumption of energy, the impact of higher petroleum prices on inflation in the U.S. economy is cut in something like one-half . . . so it seems to me one of the strongest cases that can be made for conservation is that it reduces the vulnerability of the American economy in terms of the effect of disruptions in supply and, second, in terms of price increases with no disruptions in supply, that the impact on the feed-through of inflation into the U.S. economy is reduced by these conservation programs. (149)

Dr. Jorgenson also concluded that energy price increases, such as those experienced during 1980, reinforce the beneficial impact of conservation

programs. However, he warned that a curtailment of conservation programs as a consequence of the Administration's proposed budgetary cutbacks would mean that "these energy savings would vanish, and the beneficial impact on vulnerability would be decreased and the impact on inflation would also be diminished." (150)

Chairman Fuqua also disagreed with Rep. Gregg, and concurred with Dr. Jorgenson that cutbacks in conservation activities may lead to increased inflation. He stated that, "The administration, by cutting back its energy conservation programs and thereby slowing the rate at which efficiency improvements are made, may actually be adding to inflation rather than helping to reduce it." (76)

Mr. H. Hollister Cantus pointed out an additional factor which affects the relationship between energy conservation and the national economy. According to Mr. Cantus, certain consequences of the Administration's fuel supply policies may impede some of the benefits obtainable from energy conservation in the utility sector:

> Decontrol and deregulation of basic fuel prices . . . increase the pressure on the regulated margins of the generation, transmission, and distribution community. Those particular utility companies have very little discretionary capital to invest in new, increased efficiency products to improve their own productivity, and I believe the national economy suffers from excess energy costs, because of the inability of the utility sector to improve its productivity through improved efficiency." (209)

B. FOREIGN COMPETITION AND THE INTERNATIONAL ENVIRONMENT

Several witnesses testified to the problems and opportunities related to domestic and international markets for energy efficiency equipment. Other industrialized nations have developed a market penetration strategy based on government-industry cooperation. Some witnesses felt that the U.S. policy response to this foreign competition has been inadequate; they argued that the United States needs an energy conservation policy focused on Government-industry

cooperation in the development of energy efficiency equipment. Another viewpoint suggested that the success of other nations in energy markets is due to their broader economic policies rather than energy conservation policies.

Mr. Brady, Dr. Lawrence, Mr. Podolny, and Dr. Syniuta agreed on the essence of the foreign competition problem. Mr. Brady testified that:

> In many other countries energy efficient technology is considered itself a new industry of the future which justifies comprehensive public-private strategic planning. This planning is leading our competitors to research, development and market innovations which will challenge the United States in this decade. (101)

Dr. Lawrence echoed strongly the sentiments expressed by Mr. Brady. He warned that ". . . Government needs to be working with industry because we have, in the international marketplace now, government-industry competition in well-focused teams, in areas of energy supply and energy conversion equipment." (219) Mr. Brady emphasized that the foreign competition is ". . . placing substantially more money in this field than we are." (94) He also agreed with Dr. Lawrence that foreign Government-industry teams have been successful at roding the U.S. marketplace and dominating the international marketplace for energy efficiency equipment. (219)

Dr. Syniuta concurred with Dr. Lawrence and Mr. Brady that foreign governments are increasing their expenditures on energy conversion technology and are working very closely with industry to develop new, efficient products. (245) Citing the recent effects of foreign competition on the auto industry, he also warned that the same thing may soon happen to the computer and home heating industries. (246) Mr. Podolny elaborated on the economic rationale underlying the development of the foreign competition problem:

> . . . the other societies which have lived with much higher fuel costs . . . are demonstrating that industrial-government participation, to help the nation's economy, is required for the expedited development of improved capability equipment. (247)

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He used Japan as an illustration of foreign competition. According to Mr. Podolny, the Japanese have a dual-focus energy conservation policy: project Sunshine, which is oriented toward the evolution of new, improved efficiency conversion systems; and project Moonlight, which is oriented toward new, improved conservation configurations. (249) Furthermore, he pointed out that, "The major subsidy is from the Japanese Government to private sector manufacturers to make inroads in all of the forms of equipment to provide heat, electricity, and energy conversion forms." (249)

Dr. Lawrence pointed out the advantages of the German government support for conservation equipment. He explained that the government provides different options for private sector support:

> . . . the way they go about it is contractual relationships with the private sector that we have yet to discover here. In other words, it is an R&D contractual relationship where, at the end of the program, when a piece of equipment is in prototype form, the contractor, the industry performing the research and development, has two options: they can give the money back and put the piece of equipment into the marketplace, or if it has been a failure, as research and development can be, then they give the patents to the Government, but they are not financilly impacted in the sense of a loss of capital with no return whatsoever. (249)

Dr. Maxine Savitz, Deputy Assistant Secretary for Conservation and Renewable Energy at DOE, concurred with Mr. Podolny and Dr. Lawrence that the governments of other industrialized nations have a greater policy flexibility, which gives them an advantage over U.S. capacities to develop and market energy-efficient equipment. She testified that foreign governments' conservation programs differ from those of the United States in that U.S. Government support tended to be "a combination of direct funding for research and development, and also money for grants and implementation." (628)

Mr. Brady and Dr. Lawrence agreed that the U.S. response to foreign competition has not been adequate. Mr. Brady identified general weaknesses in the industrial system for technology development. He stated that:

> There are a whole number of reasons why the United States is falling behind technologically. Our businesses are oriented toward short-term profit. They respond to the stockmarket and not to long-term debt. Our managers are rewarded for what they did last year and they are not rewarded for what they do over 10 years. Our managers are increasingly lawyers and financial people not technological people. (131)

More specifically, Mr. Brady indicated that the U.S. response to the further penetration of foreign made energy efficiency technologies into U.S. markets has consisted mainly of special tax treatments and depreciation rates. He testified that this response has not been effective. (96) Furthermore, Mr. Brady surmised that the new tax package offered by the Reagan Administration would not cause industry to invest additional capital and research into energy efficiency. (94) He concluded that what the U.S. needs--but did not have under the last Administration--is a cooperative program between Government and industry. (97)

Dr. Lawrence concurred with Mr. Brady that the U.S. response to foreign competition has been ineffective. (219) He pointed out another risk to the U.S. efficiency industry, which derives from weaknesses at the demonstration and implementation end of the technology development cycle. Dr. Lawrence stated that:

> If the Government initiates programs based on all the national benefits and analyses that they have gone through, for instance in the energy [conservation] technology programs, then terminates them, then you have a company sitting there halfway through a technology program with a couple of choices. Do we go out of business, or look for funding elsewhere? (250)

Increasingly, he warned, private industry may be tempted to seek this funding from foreign sources. (250) According to Dr. Lawrence, the foreign competition situation has created a balance of trade problem which has combined with a shortage of private capital for technological innovation to create a need for a new policy

focus. (220) He agreed with Mr. Brady that the appropriate response to this competition is to increase cooperation between Government and industry. (221)

Mr. Brady suggested that the emergence of the foreign competition problem was due primarily to the nature of the adversary relationship between the U.S. Government and private industry. He observed that:

> Industries in the United States are segregated by antitrust laws which prevent them from working cooperatively--Government and industry deal at arms length. This is not true in foreign countries. There they cut across industries and technologies; they are able to concentrate on target industries. . . . These countries consider energy efficient industry a new industry, and they are organizing accordingly. (94)

Mr. Brady argued further that Government should adopt a different role in its relationship with industry in order to curb the growth of foreign competition in domestic and international markets. He stated that:

> We must end the antagonism between industry and Government in the United States, [and] start on cooperative programs. Instead of considering Government the enemy, the Government has got to be a coordinator and help the United States to become more competitive. (97)

Dr. Lawrence elaborated on the need to increase the competitiveness of the U.S. in energy efficiency equipment markets, since this area is important to the employment of some 30 million people in the United States. (220)

Rep. Weber expressed a different view of the foreign competition situation, especially that which was originating from Japan. He stated that:

> The general state of the Japanese economy has been stronger for a number of years because of the broad macroeconomic policy this country [Japan] has been following. . . . I want to make the point that . . . there is no amount of specific fine tuning that we can do within the energy industry that is going to solve our problems unless we deal with the macroeconomic problem. (248)

Chairman Fuqua's concern over foreign competition in the energy efficiency industries was evident. Mr. Fuqua specifically mentioned that the hearing had produced a significant amount of testimony which indicated the possibility that

the Reagan Administration's proposed reductions in spending for energy conservation programs could damage U.S. capacity to compete with foreign firms:

> . . . we had several witnesses testify about the effect of the budget cuts on firms involved in providing heating and other types of equipment. They indicated that foreign government-industry teams would make inroads into the U.S. market for energy-efficiency appliances and without the help that they had been getting, with the termination of that program, their capacity to compete with those foreign firms would be impaired. (643)

C. PROSPECT FOR INCREASED PRIVATE SECTOR PARTICIPATION

The Reagan Administration proposed major cutbacks and terminations in energy conservation research, demonstration, commercialization, and implementation activities. The extent to which the private sector would pick up an increasing share of the expenses involved in these activities was a major issue at the hearings. Mr. Frank DeGeorge, Acting Assistant Secretary for Conservation and Renewable Energy at DOE, along with some minority committee Members, spoke in support of the Administration's policy position. This position assumes that price decontrols and regulatory relief would provide sufficient incentives for the private sector to pursue an adequate amount of energy conservation activity. However, other witnesses argued that market failures and other barriers prevent the private sector from supporting adequately the development and utilization of energy conservation measures.

Mr. DeGeorge asserted that the Administration's policy of increasing the cost of natural gas and oil will push the marketplace into development of more conservation. He testified that, "It will drive the American people and the American industry toward producing energy efficient products and consuming and saving oil, gasoline, and other distillate products." (511) The primary assumption of the Administration is that price decontrol and regulatory relief would

allow the marketplace to initiate any necessary energy conservation measures. Mr. DeGeorge elaborated on this assumption, stating that:

> . . . the basic thesis was that industry itself should be the primary motivator, should be the primary party that in effect decides where to make investments; that the American public will reach for more efficient standards, more efficient buildings, more efficient automobiles. (511)

Rep. Skeen argued that there is evidence that this strategy has worked in other energy-related areas of the private sector. He stated that ". . . in other industries that are critical for energy, the companies themselves are budgeting huge amounts in development funds, particularly when the profit margins are extremely high." (252) He further suggested that if the profit margin were high enough, that the attitude toward investment in the efficiency industry might change. (252)

Rep. McCurdy took a somewhat more neutral position toward the Administration's policy. He stated that:

> Regardless of our concerns and ideas, there wouldn't be conservation if there wasn't the question of price. I think that is probably the biggest variable. But I agree that we [Government] have to continue our efforts to encourage the public to do these things. (15)

On the other hand, several witnesses testified that the existence of generic and sectoral market failures along with other barriers to the Administration's policy warranted the continuation of a major Federal role in supporting the development and utilization of energy conservation measures. Dr. Stelson argued that there are generic weaknesses in the proposed policy. He testified that:

> . . . the removal of all funds for commericalization, market analysis, standard development, technical assistance, and information dissemination will not only preclude effective implementation of previous research and development but will eliminate many activities that are cost effective but have little potential for being supported by private enterprise. (86)

Ms. Joan B. Habib, along with Mr. Jack Armstrong and Mr. Grant Thompson, agreed with Dr. Stelson that the Administration's use of tax credits and deregulation policies was not sufficient to induce adequate financial participation from the private sector. (479)

Mr. Brady, Dr. Stelson, Mr. Podolny, and Mr. Thompson provided testimony which indicates that there is a series of market failures along the path from research to implementation which impedes the effectiveness of a Federal policy of non-intervention. Dr. Stelson and Mr. Brady emphasized the problems of capital and manpower shortages for research investments. Dr. Stelson suggested that one way to recover R&D costs is to patent the research output and license it to competitors. (132) However, he warned that:

> . . . the patent procedures are rather clumsy procedures. It takes several years to establish a patent. You have to invest a lot of money in the patent to establish your position, and if you are a fertilizer company you would probably rather do your research in fertilizer development, not in energy systems where you have no real interest or future. (132)

Dr. Stelson also pointed out that a lack of expertise prevents any single company from pursuing energy efficiency research and implementation; and that private enterprises are prevented from entering into effective cooperative arrangements by Government regulations. (78) For these two reasons, he argued that Federal conservation programs are necessary because they provide the leadership required to make cooperative efforts successful. (78)

Mr. Brady emphasized that the problem of capital availability affects individuals as well as companies. He agreed with Dr. Stelson that businesses in the private sector are ". . . more inclined to put money into production than you are into research". (113) However, he also elaborated that:

> . . . there is insufficient capital in the system to make some of the investments which as an economy we need, for both individuals, who do not have enough money to buy the

> Volkswagen engine [for home heating], or companies, which do not have enough capital to make the investments in energy efficiency. (113)

Mr. Podolny and Mr. Thompson focused on private sector difficulties at the marketing and implementation end of the process. Mr. Podolny explained that the private sector has a problem identifying markets. He testified that, "The key to doing that [investing in a new product venture] is that you have to forecast a market. . . . I don't think we can do that. . . . There is interference in the marketplace which precludes prerequisite forecasting." (248) Mr. Thompson stressed other imperfections which prevent the market from assessing conservation activities at their true value. He stated that:

> . . . the existence of practices such as average cost pricing, rolled in cost tariffs, subsidies for production or for research that should be conducted by the private market all prevent consumers from feeling the full impacts of the replacement costs of energy. Therefore, it is simplistic to argue, as many do, that the market alone will call for the optimal amount of energy conservation. (43)

Other testimony focused on the market failures which characterize particular sectors of activity related to energy conservation. Shortcomings were identified for buildings, industry, and utility conservation as well as for the dissemination of conservation information. In regard to the buildings sector, Mr. Thompson explained that even if one assumed a free market existed for energy, there are classic market failures which prevent an optimal amount of conservation. (39) Specifically, Mr. Thompson pointed out that there is no market for the tradeoffs between conservation and air quality, there is no way to patent or obtain adequate returns on investment for innovations in heat flow and passive design, and the fragmentation of the buildings sector means there are no institutions for capital formation to support research. (39) Additionally, in the case of rental buildings, he pointed out that when the landlord pays energy bills, the tenant has no economic incentive to conserve energy; and when the tenant pays for energy

through a separate meter, the landlord has no incentive to make capital improvements to increase structural efficiency. (40) Finally, Mr. Thompson testified that no party to the construction phase has an incentive to invest in materials or practices which will save energy for future tenants. (A159)

In regard to residential efficiency improvements, Senator Bill Bradley testified about the capacity of the private sector to pick up the expenses for auditor training from the Federal Government. He indicated that the private sector could handle this expense, but that the utilities had not taken it up as of the present time. As an alternative, Sen. Bradley suggested that rising energy prices would increase the demand for auditors to the point where energy auditing companies could be financially solvent, but that Federal involvement is required during the initial stages of their formulation. (204)

Mr. Armstrong, Rep. Ottinger and Mr. Brady commented on the market failures in energy conservation for the industrial sector. Mr. Armstrong explained that there are two major barriers to market forces prompting private sector investments for industrial conservation, "One is the cost of raising capital to put into R&D by industry, and the second is the long time to payback for true R&D programs." (151) In regard to the installation of more efficient measures into heavy industry, Mr. Armstrong testified that decontrol of the market would help solve the shortage of fuel supplies, but would not assure any progress toward improved energy productivity since, "Capital formation from decontrol does not necessarily provide the means for the development of industrial equipment and processes." (151)

Rep. Ottinger concurred with the assessment of the capital formation problem, and identified an additional barrier to industrial energy efficiency improvements:

> It has been demonstrated that industry will not pick these [industrial conservation] projects up on their own--either because the energy factor is too small with respect to their

> operations, or because they are too capital-short to be able to invest in this kind of endeavor. (539)

Mr. Brady explained that the marketplace for energy efficiency equipment is also an important one, and that, "Energy efficiency equipment will be big business for the rest of this century." (110) However, he also pointed out that a lack of support for R&D will impede the ability of price decontrols to create opportunity for U.S. private industry to exploit the growing market, ". . . prices will induce people to go to technologies but those technologies have to be around. Many of them are not around, because the United States has not made enough investments in research and we are falling behind in technology." (113) Mr. Brady further emphasized that:

> . . . if we maintain the budget as proposed, the United States will be the only government of an industrialized country which does not have an industrial energy efficiency program. We will be the only country virtually without a research program in transportation or building and community systems. (110)

In regard to the utility sector, Mr. Podolny characterized the problem as follows:

> That interface, the utility, between the fuel supplier and the ultimate customer, cannot generate excess profits to provide for improved capability. The regulatory process has a whole thesis about what they will or won't allow the utility pruchaser to pay for. That is the bind. The utilities can't generate that investment increment from the user. (253)

Mr. Cantus elaborated Mr. Podolny's point that the potential effects of fuel price decontrols would be dampened by the regulatory constraints and capital problems of the utility sector. (209) According to Mr. Cantus, the question then becomes, "Should the managers and manufacturers or improved efficiency equipment bear the burden that is left as a result of the inability of the utilities to handle the increased cost?" (210) He concluded that this would not be a prudent move, but rather that a case could be made that the overrriding

national benefits to be gained merits a moderation of the Administration's free-market policy, as is the case with national defense. (210)

Ms. Habib and Mr. Jeremy Lifsey described shortcomings in the markets for energy conservation and solar energy information. Ms. Habib pointed out that homeowners and small businesses are frequently unaware of the economic advantages of energy saving investments, and that energy information is notoriously hard to obtain, even for those with the interest and technical capability. (479) She also testified that the Administration's predictions about the workings of the marketplace were based on "an unwarranted assumption about the availability of credible information." (479) Ms. Habib concluded that Federal programs to support conservation technology and information are necessary to mitigate market failures. (479)

Mr. Lifsey explained why the solar industry does not support its own information center:

> The industry is very diffuse. It is composed of builders, architects, financiers, suppliers, real estate appraisers, lots of people. Most of these people operate small businesses. . . . These people are busy trying to do their main business. They cannot answer the questions that come in when people want to know about the latest legislation or where people could see a solar home. (455)

Mr. DeGeorge and Chairman Fuqua had some concluding remarks on the question of increased private sector participation. In attempting to explicate the supporting rationale for the Administration's policy, Mr. DeGeorge asserted that:

> I guess that you could call it an economic assumption, the thesis being that higher prices will make people face up to the basic problems of energy. . . . We have some evidence that 85 percent of the reductions in consumption are primarily due from increases in prices. (641)

However, in response to a question about what evidence existed to support the Administration's position, Mr. DeGeorge admitted that:

> . . . in general, I don't think it would be fair to categorize the answer that we have evidence that would indicate with any assurance that the industry will pick up or anyone will pick up these programs. (641)

Chairman Fuqua expanded upon the uncertainty expressed in Mr. DeGeorge's conclusion. Mr. Fuqua observed that:

> Some witnesses do not hold to the Administration's viewpoint. They do not feel like, at this point, the private sector will get the risk capital to go in and do this type of work, until the technology is better demonstrated. (644)

Furthermore, he concluded that ". . . there are market barriers to energy conservation which will not be overcome without the help of the Government." (509)

D. PROSPECT FOR INCREASED STATE AND LOCAL PARTICIPATION

Implementation of the Administration's proposal to reduce Federal support for energy conservation activities could have a significant effect on State and local participation in conservation, especially in the dissemination of information task. The extent to which State and local governments would pick up an increasing share of the expenses involved in these activities was an important issue in the hearings. Some witnesses described the evolving role of local government in residential and community conservation activity. Others pointed to the financial difficulties of State governments and the need for a continuing partnership between State government and the Federal Government. Some testimony was also given on the need to expand the role of regional information centers.

Mr. K. Baker described the nature of increasing State-level involvement in the energy extension service. He testified that, in Iowa, conservation and renewable energy sources have reached the same level of implementation through outreach and information dissemination activities that hybrid seed corn had

reached 40 years ago, and may require 10 years to achieve full implementation. (324) Homeowners, small business owners, and farmers were identified as the groups targeted by the Iowa Energy Extension Service. Mr. Baker commented further that the exising network of agricultural county agents were being used to help deliver energy programs. (324) He stated that the use of the existing extension service for energy outreach makes more sense in some States than others. (449) Mr. Baker also explained that some States had incorporated this type of outreach into their business management programs for small business, and that other States planned to fully integrate energy services into their existing county extension service programs. (449) However, Dr. Stelson pointed out that the energy extension is still actually a small and fragile operation by comparison with the agricultural extension service. (79)

Ms. Ann Cline emphasized the importance of State and local efforts. She argued that local government plays a crucial role in the evolution of any resource system, and pointed out that, "As waste becomes an economic fuel, as local water supplies become energy sources, and as waste heat from industry and utilities becomes economic for nearby users, we once again look to local govenment for support." (269) Ms. Cline also focused on the importance of delivery systems for conservation technologies. She stressed that "local energy efforts have got to address the impact of their actions on existing delivery systems." (271) Ms. Cline elaborated on this idea by stating that:

> This may mean that a local government will look at those things which only local governments can do--cogeneration, district heating, and urban waste projects or they may encourage things which would be done by the private sector conservation programs. . . . (271)

She went on to describe the Community Energy Management Research Program at DOE. This program supports the analysis of risks and impacts of community energy options, and encourages communities to evaluate and select the appropriate

combination of alternatives. Ms. Cline observed that most cities without this program have no systematic way of assessing energy conservation possibilities. (269) She concluded that it would be unlikely that other sources of support for this program would be found outside the Federal Government. (269)

Several witnesses testified on different dimensions of the need for a financial partnership between State governments and the Federal Government. Rep. Moffett emphasized the need for Federal assistance to the States. He remarked that State governments were encouraging van pooling and that some innovative things were happening at the school board level; but added that in Connecticut, for example, the State government was in rough shape financially and did not have the resources to enable it to do a great deal of experimenting. (15) In contrast, Mr. William Woellhof stressed the responsibility that the States have to fund energy conservation efforts. He remarked that States should have responsibility to provide matching funds for outreach programs, and that such a requirement should be coordinated with State budgeting cycles. (442)

Dr. Stelson emphasized the cooperative nature of the partnership required among Federal, State, and local governments. He testified that, "Over a period of several years, a successful planning and development of effective energy program systems have been put in place with funding by both the Federal as well as the State and local governments." (92) He indicated further that the budget changes recommended by the Reagan Administration would signal the State and local governments that their contribution toward solving the energy problem is not wanted or needed, and would jeopardize the evolving partnership with the Federal Government. Dr. Stelson testified that:

> Many States are putting large amounts of money into energy conservation and energy development and doing so in concert with Federal programs. This [Administration's] budget proposal I think would essentially destroy that partnership. (79)

This would have a serious dampening effect on conservation, stated Stelson, because:

> What works in one part of the country will not work in another. Energy efficient houses in Florida are different from energy efficient houses in Minnesota. It is critical that regional, state, and local institutions participate in the total development of improved energy systems in this country. (92)

Another issue of State and local participation focused on the dissemination of energy conservation information. In this regard, most of the attention was directed toward the regional solar information centers. Ms. Habib agreed with Dr. Ron Doctor and Mr. Jeremy Lifsey on the need to combine conservation information services with existing solar information services at the regional centers. She stated that:

> Certainly solar R&D is different from conservation R&D, but as far as information services is concerned, it is just crazy to give people information on one and not the other. One thing I would love to see done is coordinating the two. (500)

Dr. Gene Frankel, of the committee staff, suggested the need to distinguish the role of the regional centers from that of the Energy Extension Service and a national clearinghouse. (504) Dr. Doctor indicated that there are gaps in the information services provided by the Federal Government and by the marketplace. He stated that there is a need for regional information centers because, "The Feds are too remote from local and State problems and needs." (496) On the other hand, he pointed out that there are some services the regional centers can provide which are not being fulfilled by the market. Dr. Doctor identified these activities as:

> . . . coordination, transfer of real experiences from one State or locality to another, development of a common methodology, with local data, for economic analyses; . . . filling common needs for educational materials, curricula, training programs; filling common needs for consumer assurance programs; centralized production and distribution of reports; experience on utility issues, PURPA [Public Utility Regulatory Policies Act], rebates, financing; experience with local government ordinances. . . . (496)

Dr. Doctor concluded that regional information centers, funded by member States, could have a significant impact on existing State and local barriers to the implementation of conservation and renewable energy systems. (495) In reference to the experiences of the Western Solar Utilization Network, he claimed that:

> Regional offices which run Federally mandated programs and grants do not have either the State presence of our solar offices or Western SUN's industry focus. They simply are not structured to be as responsive to industry, utility, State, and local needs as is Western SUN. (496)

IV. FUTURE ROLE OF THE FEDERAL GOVERNMENT

A. COMMENTS ON PAST AND CURRENT POLICY

The determination of the proper role for the Federal Government in energy conservation is an important component of both short-term and long-term national enery policy. The Government increased dramatically its role in conservation research, development, demonstration and implementation for all sectors of the economy during the period from FY75 through FY80. It has intervened primarily in areas where the greatest amounts of energy savings seemed possible: industry, buildings, and transportation. Additionally, the Government has made a significant effort to assist State and local governments with their conservation efforts. A variety of opinions about the past, present and future role of the Federal Government in energy conservation were expressed at the hearings.

The current perspective of the Administration, Mr. DeGeorge testified, was that the Federal Government's role in energy conservation should be minimized. He argued that the Administration's initiative to reduce spending on energy conservation programs was consistent with its overall effort to reduce the Federal budget. He further emphasized that the increasing cost of oil and natural gas ". . . will push the marketplace into development of more conservation per se and more products that basically can address the consumption process itself. . . ." (511) Additionally, Mr. DeGeorge observed that there had been a substantial reduction in energy demand during the last 2 or 3 years, and that energy prices would nevertheless be the primary incentive for conservation.

According to Mr. DeGeorge, the Administration's basic policy outlook is that:

> . . . industry itself should be the primary motivator, should be the primary party that . . . decides where to make investments; that the American public will reach for more efficient standards, more efficient buildings, more efficient automobiles. And as those marketplaces develop, the Government has a role only in long-term research and development. (511)

In elaborating on this statement, Mr. DeGeorge pointed out that the Administration plans to reduce significantly the Government's role in commercialization activities related to energy conservation. He stressed that the Government should not have a role in large scale demonstrations or in any of the processes which take equipment from the stage of technological feasibility to the development of market products. Following this policy will mean a great reduction in the operations of the Solar Energy Research Center (SERI).

Similarly, Mr. DeGeorge also indicated that the Administration is taking a harsh look at its information dissemination mechanisms. He noted that its efforts to greatly reduce these activities will mean a substantial reduction, if not elimination, of the Regional Solar Energy Centers. (511)

In response to these remarks on the Administration's position, Rep. Tom Harkin stated that:

> Unless you are prepared to argue that there has been 80 percent fraud, waste and abuse in . . . the energy conservation program, then . . . [the Administration's policy] does present a complete reversal of the direction we have been going. (645)

Reps. Robert Walker and James Sensenbrenner questioned whether DOE in general, and its energy conservation programs in particular, had indeed shown any evidence of being effective. Rep. Walker stated that, "It seems from my perspective that over the period of years, we have shoved some money down the throat of the Energy Department without very much knowledge of whether the money could be effectively used." (633)

In regard to the $677 million difference between the Carter and Reagan FY81 proposals for energy conservation, Rep. Sensenbrenner argued that ". . . . it seems to me that by spending this huge amount of money, as the Department of Energy does, that we're not getting the $677 million of return on the overall program." (19) Rep. Walker also spoke in support of the Administration's current position. Commenting on the past performance of conservation programs, he stated that:

> . . . there may have been gross mismanagement and to decide, when we are looking at ways to cut the budget in order to get inflation under control, that indeed those are areas that deserve our consideration. . . . (137)

However, some witnesses dissented from this point of view, and instead argued that many past conservation efforts supported by DOE had performed well and proved to be highly cost-effective. In regard to the overall significance of these programs, Ms. Habib pointed out that President Carter and the current Secretary of DOE, Mr. Edwards, had referred to energy conservation as the "cornerstone of our energy policy." (479) Dr. Bustard testified that ". . . the total conservation technology development efforts by the DOE have already proven to be cost beneficial to the Nation." (164) Dr. Jorgenson agreed with Dr. Bustard about the value of conservation programs. He stated that:

> If you look at the conservation programs, those programs have a very high cost/benefit ratio. The benefits increase when the prices of fuels go up as they do after decontrol, so the conclusion is those programs for conservation are programs that become more attractive with the decontrol of fuel markets rather than less and, therefore, deserve support. (193)

Other witnesses expressed strong opposition to the Reagan Administration's policy for energy conservation. Dr. Stelson testified that:

> . . . Conservation technology is clearly the fastest, cheapest, most cost-effective, most environmentally beneficial investment of the government dollar in any energy technology. To abandon those technologies at this time is to recommend mismanagement of the Federal energy program. (85)

Rep. Moffett concurred with Dr. Stelson. He testified that:

> What I think is happening, is not a matter of just cutting the Department of Energy's budget but rather, the Administration is taking an anticonservation stand aside from what one gets in the marketplace . . . to say that the Government should retreat from being the catalyst in the conservation effort, I think is a very, very serious mistake indeed. (19)

Some witnesses also criticized the Administration's proposed emphasis on R&D, and argued the advantages of supporting implementation and other types of R&D. Mr. James L. Barker testified that the Federal program for recovering energy from solid waste has been limited primarily to front-end financing, and suggested that if the Government backs down from continued support through construction phases there could be a disastrous loss of project implementation. (257) Additionally, Dr. Stelson and Mr. Sant emphasized the linkage between R&D and implementation. Dr. Stelson pointed out that:

> The merit of the long-range research and development activities frequently rests with the coupling it has with shorter range commercialization, market development, establishment of standards, technical assistance, and information. For example, research and development which is not delivered with a system of technical assistance and information may have no significant long-range or short-range energy impact. (87)

Mr. Sant commented about the Federal role in conservation for the entire range of sectors and technologies. He emphasized that during the 1980s, the primary need would be for the implementation of available technologies rather than for short-run R&D. (168) However, he also indicated that during the 1990s a greater need would arise for new applications and new technologies--particularly in energy intensive industries. (167) Mr. Sant explained that:

> These are industries that are spending little or nothing on R&D and the vendors likewise are spending little on it. They are skeptical of the market because of the very high cost of capital and the high inflation rates that tend to put target returns much lower than normal. . . . Contrary, I guess, to the free market premise about this, it seems decidedly clear that R&D stimulus is needed. (167)

Mr. Sant testified that policies to lower the cost of capital such as a general R&D tax credit or availability of risk capital would be desirable. He further suggested that R&D for short-run technologies should be reduced while funding for basic conservation research and long-term implementation should be continued and possibly increased. As an example of the change in emphasis, he mentioned the idea of R&D to test new ways of delivering existing technologies. (168)

Dr. Stelson outlined a general strategy for future Federal investment in conservation activities. He argued that the best route for Government is to examine systematically each program area and then ". . . evaluate where investment of Federal dollars could effectively stimulate private enterprise partnership and yield energy objectives that provide the greatest benefit for the least expense." (86) Furthermore, Dr. Stelson emphasized the complexity of making Federal investments in conservation:

> I think the Government budget money should go where there is the biggest payoff for the dollars expended. Sometimes that is near term. Sometimes it is long term. Sometimes it is R&D and sometimes it is informational systems, and because conservation technology is a spectrum of a lot of different things, generalization is basically an excuse for poor management. (134)

B. ENERGY CONSERVATION IN BUILDINGS

The primary issues for the Federal role in energy conservation for the buildings sector relate to information/research, training/education, finance, standards/regulation, and weatherization/auditing. Several participants testified about the importance of generating and disseminating information about buildings conservation to industry and consumers. Rep. Jim Dunn, Mr. Gene C. Brewer, and Mr. Gardner S. McBride commented on the information needs of the buildings industry. Rep. Dunn agreed with Mr. Thompson that companies in the

buildings industry do not have the capability to do R&D and that there are difficulties in disseminating information to the industry. (66) Rep. Dunn stated that:

> It's a great deal simpler to get information to the Seven Sisters, to the Big Three, or to four for five aircraft manufacturers than it is to 400 [construction] companies, let alone several million companies making up this [buildings] industry. (66)

Mr. Brewer and Mr. McBride emphasized the importance of information to the implementation process. Mr. Brewer testified that the ". . . rapid application of conservation techniques can be enhanced if the Government fosters the development and dissemination of fundamental knowledge and guides to its use in implementing various building energy conservation techniques." (25) Mr. McBride concurred with Mr. Brewer and stressed that the greatest need of the buildings industry is information about the reliability of products and programs under field conditions. (62) He testified that:

> The one major point that I would like to bring before this committee is that we need information based on field experience...If we can have some confidence that the technologies that are already researched or are now just emerging will tually do what is suggested they can do, our industry can be much more responsive in applying those products and services in both the reconstruction of existing properties and in the construction of new properties. (58)

Rep. Claudine Schneider pointed out the need for Federal assistance in getting information on home heating efficiency improvements to consumers. However, she also indicated that there should be a limit to the Federal role in implementation. Rep. Schneider remarked:

> I feel that it is the Government's role to provide information, but I also feel that it is the role of the private sector to really get in on a major PR campaign to persuade the bankers, the other investors and folks who are building new housing units that the technology is there to some degree, and that we should get going with the best available technology. (67)

Senator William Bradley also provided testimony on the need to supply information to consumers. He stated that this problem is significant to the national conservation effort:

> Well, I think that the reason that conservation has not achieved savings of 20 or 30 percent instead of just 8 percent last year is that there are other obstacles to its proliferation, other than simply cost [of petroleum fuels]. One is information. People don't have the information or the knowledge to know what they need to do their homes. (204)

Mr. Brewer, Mr. Thompson, Dr. Lawrence and Mr. Theodore F. Mariani provided testimony on the continuing need for a Federal role in research for buildings conservation. These witnesses emphasized that past Federal support for research has been fruitful, but also pointed out that there are continuing research needs which the buildings industry, composed primarily of small companies, does not have the capability to support. Mr. Brewer observed that Federal programs have played an important role in recent years in quantifying and articulating the need for greater efficiency in buildings and in assisting State and the local governments and the private sector in finding effective means for exploiting the potential for energy savings. (21)

Mr. Mariani agreed with Mr. Brewer that past programs had produced useful results. He explained that DOE had, with the cooperation of industry, collected technical data and developed professional expertise related to building design and energy consumption that could not have been produced by the building industry alone. (54) However, in regard to funding, Mr. Mariani pointed out a key obstacle to industry-supported research. He observed that most architectural firms are small, and thus cannot underwrite the research needed to produce truly innovative solutions for energy design problems. (55)

Mr. Brewer stressed the importance of continued and increased funding for building energy sciences related to envelope systems and materials, ventiliation

and controls, and performance calculations and diagnostics. (33) Dr. Lawrence and Mr. Mariani concurred on the need for continued support, but placed greater emphasis on the need for applied research. According to Dr. Lawrence, foreign competition is increasing the need for Federal support. In the case of heat pumps, he indicated that, "At this point in this country, our gas-fired heat pump programs are in the status where there are laboratory prototypes just barely now operating." (222) By way of comparison, he pointed out that the Japanese have already made first-of-a-kind, revolutionary gas-fired heat pumps which are now being tested and used by American gas companies. (222) Mr. Mariani argued that DOE should extend further assistance to architects, engineers, and builders in developing a uniform audit procedure, computer software to model building retrofit strategies and to evaluate the cost-effectiveness of alternative design options. (57)

In contrast, Mr. Thompson focused on the need for social research and program evaluations related to conservation in buildings. He stressed the importance of funding for "non-hardware" conservation research, such as the work done on why people are motivated to save energy in their daily lives. (46) He cited work done on thermal comfort at Princeton University that has already helped builders, and added that: ". . . we need to know more and to refine these first products of 'software' research. Again, severe budget cuts will only hurt this effort." (47)

He also accentuated the need for increased attention to the assessment of conservation programs' impacts. He remarked:

> One of the things that I've pressed for the Department to do throughout its history is to spend part of its budget on evaluation of its conservation programs. Where they have done this and where the evaluation has been credible from a methodological point of view, they've shown variation, but it has been strongly more successful than if similar evaluations were done on many of the supply technologies. (63)

Some testimony was also given on the significance of education to conservation in buildings. Mr. Brewer stressed that this area is one of the most important aspects of Federal involvement in buildings conservation. He explained that the DOE program had helped to introduce resource materials into the curriculum of a majority of professional schools of architecture and engineering, and as a result, had stimulated the introduction of energy-efficient building design. (23) He also concluded that DOE efforts in education merited continued Federal support. Furthermore, Mr. Brewer testified that ". . . additional support may be needed to devise a system of education and training seminars to disseminate the results of the research by working with the private sector." (23)

Senator Bradley and Rep. Moffett testified that consumer financing is a major problem for conservation in residential buildings. In addition to the difficulties home owners have in obtaining conservation information, Sen. Bradley indicated that ". . . financing is clearly an issue. They [home owners] don't have the money to get it [conservation measures] done in many cases." (204) Rep. Moffett provided testimony in which he pointed out that this issue also applies to weatherization for residential tenants. He stated that:

> Apart from the inexactitude and lag times involved in market forces, there are other significant obstacles to conservation. For many low-income and working families, the capital needed for investment is lacking, interest rates are prohibitive, and tax credit subsidies still require up-front funding. (6)

The effectiveness of regulations and standards as policy tools to encourage conservation in buildings was an important issue raised at the hearings. Mr. McBride recounted that there had been some difficulties with Emergency Building Temperature Control Regulations (EBTR). He stated that:

> We learned that in practice it's very difficult to predict what the real results of a proposal or product or a service are going to be when tested under field conditions. (58)

As a result of experience with the EBTR program, Mr. McBride concluded that: ". . . no amount of research can replace practical implementation of energy conservation strategies, programs and products." (61)

Rep. Wolpe agreed that there had been problems with the approach taken in the EBTR program. He concluded that allowing for greater flexibility in implementation might improve the effectiveness of other regulatory approaches to buildings conservation. Mr. Wolpe explained that:

> I think we made a mistake on the thermostat regulation. I happen to think that had the Federal Government adopted the posture of mandating a certain required reduction in the amount of energy consumption--within businesses, for example, 5, 10 percent, or whatever--and allowed local businesses and other public facilities to determine how they were going to achieve that savings, much like the city of Los Angeles did . . . that we would have achieved . . . an energy savings even greater than that which was mandated . . . [and] with much less frustration and resentment. . . . (17)

In regard to the effort to establish Building Energy Performance Standards (BEPS), Mr. Brewer suggested that a voluntary approach might be more effective than a mandatory one. He stated that:

> . . . we believe that the issuance of a voluntary guideline will be far more favorably received and have greater immediate impact on design and construction of new energy-efficient buildings than can be expected from a Federal standard promulgated as a regulation. (24)

Mr. Brewer also concluded that funding should be provided to complete the development of BEPS guidelines. However, he also suggested that, "Work on the rulemaking beyond completion of the research necessary to prepare these guidelines should cease, and funds intended to facilitate such work should be redirected for education and training purposes." (24)

Regarding regulatory aspects of buildings conservation programs, Mr. Thompson mentioned the residential utility billing system explored by DOE. In this system,

utility bills for renter-occupied buildings are divided up in some way proportionate to floor space so that tenants feel some kind of financial responsibility. He concluded that, "I think for myself that the landlord-tenant area may be one of the places where regulation may have a place to play." (65)

The Administration proposed that DOE's role in low income weatherization be be eliminated and that the Federal role should be significantly reduced. However, several participants in the hearings emphasized the importance of weatherization programs for residential buildings, and argued for a continued Federal role in weatherization assistance. In regard to the Administration's position on the weatherization program, Mr. DeGeorge testified that:

> We are not abandoning the weatherization program. The block grant program that HUD will administer will, to the extent that the States and local governments want to make the decision, make money available to the States to put into a weatherization program. (642)

Rep. Wolpe, in contrast, pointed to economic advantages of weatherization. He stated that the experience with low-income weatherization in Connecticut illustrates that ". . . conservation need not be a matter of personal sacrifice, but rather greater energy efficiency by means of technical fixes. It also means an economic savings." (16) Dr. Stelson and Rep. Moffett concurred with this assessment. Dr. Stelson pointed out that weatherization is ". . . far more cost effective than dozens of other programs in the Federal budget which stimulate energy inefficiency rather than energy efficiency." (89) Rep. Moffett described how a DOE low-cost/no-cost conservation program may have induced energy savings of as much as 25% in the New England area. (4) When asked if the Federal outlays for emergency fuel assistance would be more cost-effective if used for home insulation and other measures of the low-cost/no-cost program, he testified that, "No one can look at that program [low-cost/no-cost] and deny that it's saving an enormous amount of energy that [otherwise] wouldn't be saved." (10)

Rep. Harkin was in agreement with Rep. Moffett. In regard to the fuel assistance program, Rep. Harkin stated that:

> . . . we shovel the money out, $1.5 billion, and it just goes up the stack and into the oil companies' pockets. It would seem to me that we ought to be taking some of that $1.5 billion, and insulating these homes or doing something with them other than just paying the fuel bills. (10)

Dr. Stelson agreed that weatherization should be given a higher priority than fuel subsidies because it provides a more cost-effective way of ensuring adequate energy services for low-income groups. (88)

Testimony was also taken on the difficulties of encouraging the utilization of weatherization measures. Rep. Moffett stressed that existing non-marketplace incentives had produced some conservation effects and that there is a continuing demand for these incentives. However, he warned that ". . . what I'm worried about is that that progress is about to be wiped out in a very, very swift and brutal fashion." (9) He went on to identify four obstacles to the implementation of energy conservation measures in buildings occupied by "working people, poor people, and middle income people." These obstacles include the problem of up-front cash, the problem of high interest rates, lack of adequate information, and the lack of incentive. (3) Rep. Moffett also gave the example of the incentive obstacle for the case of renter-occupied units in which neither the landlord nor the tenant may see a financial gain from installing relatively expensive conservation equipment. (3) He indicated that investment in a new furnace was one instance where the tenant does not perceive a possible financial gain and the landlord may consider the payback on the investment to be marginal. (11) Rep. Moffett concluded that ". . . I think it's obvious . . . that you've got 26 million renter-occupied units and in many instances, there is just no incentive to conserve." (12)

Sen. Bradley testified that there is also an incentive problem for home owners. He focused on the need for an energy auditing service to assist implementation:

> I'm suggesting you need a one-stop delivery system. . . . The record shows that you cannot demonstrate that for every dollar you send out you can generate some actual savings. Therefore, you have to have a measurement mechanism to determine what is the savings for the particular measure taken. (207)

Sen. Bradley pointed out that although the utilities had not put out a sufficient effort to inform consumers of the availability of auditing services, future increases in energy prices should increase the demand for auditors. (204) He concluded that the Federal Government should provide some initial encouragement to the development of private sector companies which would provide energy auditing services for home owners. (205)

C. INDUSTRIAL ENERGY CONSERVATION

Several witnesses testified about the importance of energy conservation policy for industry. Some attention was given to the significance of Federal support for participation in the international marketplace. However, most witnesses focused on the past effectiveness of the industrial conservation program and alternative strategies for future Federal support. Chairman Fuqua pointed out that France, West Germany, and the Netherlands outspent the United States in FY80 for industrial conservation R,D&D even though our industrial base is three times the size of that in any of these nations. (510) Mr. Fuqua concluded, that, "It is not clear how we can maintain our international competitiveness as well as our needed productivity growth with reduced Federal support of industrial R,D&D. . . ." (76)

Mr. Brady testified that the Administration's policy will not enable industry to compete effectively in the international marketplace. He specified that more favorable tax relief and improved depreciation rates would not provide U.S. industry with an adequate response to foreign competition in home furnace-efficiency equipment. (96) Instead, he stressed that the need is for maintaining a competitive pace in industrial energy research and that, "We do not believe that industry is likely to spend its newly available money on research." (96) The faster rate of depreciation, Mr. Brady suggested, will encourage writing-off new equipment and investments but will not be used for research and ". . . will be of little use to inventors and high technology research companies." (106) He explained that industry does not traditionally spend discretionary capital made available by a tax cut on research, development, and demonstration; and there is no evidence that the historical formula for investment in research by industry will change. (106) Mr. Brady concluded that ". . . the companies and institutions which specialize in energy efficiency will be hardest hit, thus slowing further energy research." (106)

Dr. Lawrence, Dr. Stelson, Mr. Armstrong, and Dr. Bustard agreed that the DOE industrial conservation program has been very successful. Dr. Lawrence testified that the program has assisted the private sector and helped combat foreign competition:

> . . . this is one arm of Government that has shown conclusively how to work effectively with the private sector in accelerating revolutionary technologies into the marketplace. That kind of approach should be taken as an example of what the Government ought to do in order to protect our employment in those areas, and give us the capability to compete in these international marketplaces in the future. (221)

Dr. Stelson focused on the economic efficiency of the program. He testified that, "Industrial energy conservation is the most cost effective

and dynamic energy efficiency program by any objective measure or evaluation." (90) Mr. Armstrong, on the other hand, provided an illustration of how the industrial conservation program works. He recounted that:

> Certain cost-shared demonstration programs have caused energy saving devices such as cogeneration systems to be built for installation at industrial sites. This helps to overcome an industrial manager's reluctance to install an unproven device that might interrupt or jeopardize his production. (152)

Dr. Bustard explained in more general terms how the program produces its impact. He stated that:

> The Industrial Energy Conservation Program has been well structured by DOE management to achieve its end objectives. It consists of many relatively small undertakings rather than several large projects. This approach minimizes the overall risk of failure while ensuring a broad spectrum of industrial applications. Although some projects will ultimately fail in the R&D process, the energy savings realized from those that prove successful will more than compensate for the expected failures. This is an important aspect given that the Program's strategy is directed toward sponsoring research and development of high-risk, large energy-savings technologies which would not have been undertaken by industry independently. (163)

Despite the past successes of the DOE program, two witnesses indicated that the need for Federal assistance to industry remains. Mr. Sant stressed the importance of R&D support to the industrial sector since it is the only sector for which the least-cost strategy forecasts a growth in energy demand through the upcoming decades. (166) He emphasized that:

> With existing technology, we don't find as much flexibility in the industrial sector, even though a lot is going on. A lot of cogeneration is coming in because it is cost effective, but the industrial sector is still not showing the kind of flexibility that the other two sectors show. (167)

On the other hand, Mr. Armstrong focused on general economic trends which affect the outlook for privately-sponsored industrial energy R&D. He pointed

out that, "Government sponsorship of R&D declined from 1.6 percent of the Gross National Product in 1968 to 1.1 percent in 1980. At the same time, industry's R&D funds have been spread over an increasingly wide range of problems. . . ." (154) He also stressed that:

> . . . a corporation must now earn 18 percent of pretax income in constant dollars on investments versus 7 percent in the early 1960s. . . . Thus, the discount rate for future earnings has increased so much that only very short term investments with paybacks of 2 or 3 years are economically feasible. (155)

Mr. Armstrong added that significant technological developments are difficult to bring to fruition with such a short time horizon. (155) He concluded that, "Little government funding has been provided for improving energy productivity in industry, and yet this is the sector having both the greatest need and the most promise." (156)

In regard to the Administration's proposed budget, Mr. Armstrong expressed concern that a broad terminiation and reduction of efforts for industrial conservation ". . . would bring a premature end or would greatly delay the conclusion of several important technology development and demonstration programs. (152) Dr. Stelson agreed with Mr. Armstrong. He testified that, "It is somewhat ironic that those programs such as industrial conservation that are most cost effective and most energy efficient are the highest priority to be eliminated from Federal funding support" (91)

The proper Federal role in industrial conservation, Mr. Armstrong emphasized, is to improve energy productivity. (150) He testified that:

> To assure that the technologies for improved industrial processes are developed, that is what I call the proper role for Government. Improved energy productivity has been proven to be the only low cost remaining source of supply. (150)

Mr. Armstrong proceeded to offer some policies which would enable the Federal Government to fulfill this role. He suggested that the Federal role could

operate through R&D sponsorship whereby the Government is reimbursed at a later date from eventual profits. (151) According to Mr. Armstrong, an alternative would be to provide industrial R&D tax incentives and an investment tax credit for the development and purchase of efficiency equipment. (151) In conclusion, he remarked that:

> R&D tax credits may prove to be particularly effective in stimulating new process research in certain energy-intensive basic industries such as steel, cement and paper. R&D spending in these industries has lagged far behind even the low figure for industry averages. . . . (157)

D. OUTREACH AND INFORMATION DISSEMINATION

Several witnesses provided testimony on the importance of a Federal role in outreach and information dissemination. Their statements focused on the types of information needs that exist, the problems with existing arrangements for meeting these needs, and the prospects for a future Federal role in this area of energy conservation activity. Mr. James Duffus III provided a useful definition of the significance of the outreach function. He stated that:

> Outreach is the process of encouraging consumers through information to voluntarily implement energy conservation measures. Consumers' awareness of available energy conservation opportunities is important in their decisions to implement energy conservation measures. If consumers do not have and are not effectively provided comprehensive information, the extent to which they can or will realize available conservation opportunities will be limited. (439)

Ms. Habib and Rep. Harkin agreed with Mr. Duffus on the importance of information to the implementation of conservation measures. In regard to the types of consumers and the variety of their information needs, Ms. Habib testified that:

> . . . useful economic data is only one type of information that needs to be available to home owners, business people and small industry. They need to know how to find knowledgeable contractors, architects and builders.

> They need help assessing the efficiency of products, locating materials, equipment and supplies. They need to know about warrantees and guarantees that are offered for products and services. They need to know if and how much tax credits, State or Federal are available to them. (479)

Rep. Harkin agreed with Ms. Habib that effective information dissemination is essential for the marketplace to work efficiently in the conservation and solar areas. He stressed that in order to make sound purchasing decisions, consumers need information about product availability, product reliability, cost, energy savings potential, payback, and the location of dependable suppliers and installers. (307) Additionally, he pointed out that:

> . . . if home builders, contractors, architects, and engineers do not have the latest information on energy efficient buildings, equipment, and designs, they cannot offer their customers the most energy conserving homes and offices possible. (307)

Rep. Judd Gregg disagreed, arguing instead that rising energy prices will provide sufficient incentive for the implementation of conservation measures without a significant outreach effort. Rep. Gregg stated that:

> I would say that people who are confronted with price increases which they cannot afford, or which they feel are disrupting their ability to survive, are definitely changing their lifestyles and not standing by and looking into the air saying, 'I can't do anything about this; I don't have the knowledge.' (135)

Dr. Stelson, Rep. Fish, Mr. Duffus, and Ms. Habib agreed that the existing problems with the Federal apparatus for outreach and information are significant, and that a restructuring of program activity is in order. Dr. Stelson testified that, "I don't think we give it enough resources and the information programs have grown up from odds and ends of programs for specific purposes. It has not been integrated into a total comprehensive delivery system." (130) Rep. Fish concurred, and put the problem into the perspective of the potential information user. He stated that, "I think you get to the point sometimes where you discourage somebody from contacting an agency for information simply because there are so many competing agencies with the same sources of information." (130)

Mr. Duffus provided a more penetrating evaluation of the outreach effort. He testified that a study performed by his group at the General Accounting Office found that DOE's outreach programs were poorly managed; placed undue emphasis on providing limited, general information; and supplied inadequate resources for program evaluation. (440) Despite the many deficiencies found, he emphasized that the Energy Extension Service did not need to be terminated, but rather that it needed to refocus its thrust. (440) Mr. Duffus suggested that the program should take a more active role in outreach efforts--a role focused on encouraging energy audits and on delivering more personalized and tailored information to consumers. (442) He concluded that, "Because of its onsite energy audit feature, the Residential Conservation Service (RCS) should be the key program in this [DOE outreach] strategy." (442)

Ms. Habib focused on another shortcoming of the information dissemination activities of the Federal Government. She pointed out that existing information centers are explicitly and foolishly restrained from including conservation information when they are dealing with solar--and that this division should be eliminated. (480) Ms. Habib concluded that each of the three major centers should be expanded to include conservation information and should be made to focus on a particular segment of the user community. (481)

Mr. Thompson, Mr. Jeremy Lifsey, Mr. Fish, and Ms. Habib agreed that there is a continuing need for a Federal role in information dissemination. In the buildings sector, Mr. Thompson stressed the need for a major Federal role in creating and distributing information to consumers regarding products, processes and designs. (40) Mr. Lifsey argued that information from the National Solar Heating and Cooling Information Center (now the Conservation and Renewable Energy Inquiry and Referral Service) has been the deciding factor for many home owners to install solar, and has helped manufacturers and distributors to increase

sales. (454) He further stated that help is needed to facilitate information exchange between researchers, builders, manufacturers, and installers and, ". . . that is where the Government and an information center can come into play." (456) Mr. Fish concurred with Mr. Lifsey, and asked, "What will be the focal point for the public, for local officials to turn to to get information of the sort that used to be provided by these programs?" (535) Ms. Habib agreed on the continuing importance of Federal assistance for outreach activities. She testified that:

> Information dissemination is an appropriate role for government. Not only because the private sector won't do it, but because the very scale by which the Federal programs can collect and dispense information makes them unbelievably cost efficient." (487)

E. COMMUNITY SYSTEMS

Some witnesses provided testimony on the importance of the Federal role in community systems. Mr. K. Barker and Rep. Fish commented on the Urban Waste Program. This program is comprised of loan guarantees, price supports, direct loans and purchase agreements to assist municipalities in generating energy from solid waste. In regard to the provisions set out for this program by the Energy Security Act, Mr. Barker testified that, ". . . the most useful of these is the price support loan." (272) He explained further that, "It is probably the least expensive for the Government. It probably has the highest impact on the project." (272) In particular, Mr. Barker concluded that, "The price support loan addressed the real issue in waste to energy . . . that early year economics are not competitive with land fill disposal." (272) Since these projects are the responsibility of municipal governments and do not involve a question of marketplace development, Mr. Fish expressed a concern for identifying the rationale for eliminating the Federal incentives put in place. (535)

Another community energy conservation system, district heating, was also a topic at the hearings. A district heating or cooling system transports thermal energy from a central source into a piping network that distributes the energy to connecting equipment in buildings. The major problem for district heating is in creating incentives for implementation. Mayor George Latimer of Minneapolis, Minnesota provided testimony on district heating stating that, "Perhaps our most significant barrier is that in many cases a major renovation of existing buildings must be carried out before they are compatible with hot water." (279) In regard to financial incentives for system construction, Mr. Latimer pointed out that, "We believe that tax exempt financing would be the only viable way to provide the capital at a low enough cost to enable us to construct such a system." (279)

Mr. John J. Gunther also provided testimony on district heating. He stressed that a major barrier to implementation is the requirement of cooperation among a number of actors--especially investor-owned utilities and cities--which have not had to work together before. (302) In addition to the problem of public-private and intergovernmental cooperation, Mr. Gunther also noted that energy charges generated by electricity or gas enjoy a tax-exempt financing advantage which is not available for district heating systems. (303) In regard to European district heating, he indicated that the government of West Germany is outspending the United States in both relative and absolute terms. (288) The German effort is characterized by ". . . a joint federal-state investment program for district heating construction, which is expected to increase." (288)

Dr. Stelson made a general observation of the Federal role in conservation programs for consumer products and community systems. He testified that:

> This area of energy conservation, probably more so than most others, involves complex institutional barriers which prevent free enterprise mechanism[s] from working

effectively and requires leadership, coordination, and stimulation by government. Energy efficiency in consumer products and communities have enormous potential for displacing large amounts of scarce fossil fuels. . . . This area more than any other involves government now and will always involve government in the future. (90)

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